ABSTRAK

Penelitian ini bertujuan membangun Sistem Pendukung Keputusan (SPK) berbasis web untuk menentukan kelayakan penerimaan beasiswa Sanata Dharma Student Fund (SDSF) menggunakan algoritma *Extreme Gradient Boosting* (*XGBoost*) dan *SHapley Additive Explanations* (*SHAP*). Penelitian menggunakan 949 data historis penerima beasiswa dengan 34 fitur awal yang melalui tahapan *preprocessing*, normalisasi menggunakan *MinMaxScaler*, seleksi fitur, pemodelan *XGBoost*, dan interpretasi menggunakan *SHAP*. Hasil penelitian menunjukkan bahwa model terbaik diperoleh pada *K-Fold* sebanyak 5, *n_estimators* sebesar 100, *max_depth* sebesar 3, *learning_rate* sebesar 0,1, *subsample* sebesar 0,7, *colsample_bytree* sebesar 0,7 dan *gamma* sebesar 0 dengan akurasi *cross validation* sebesar 82,08% dan akurasi *testing* sebesar 81,05% dengan *precision* sebesar 78,07%, *recall* sebesar 89%, dan *F1-score* sebesar 83,18% menggunakan 20 fitur terpilih. Analisis *SHAP* menunjukkan bahwa kepemilikan SK Tidak Mampu, jumlah tagihan listrik, kondisi orang tua, penghasilan orang tua, jumlah tunggakan pembayaran kuliah, serta aktivitas dan prestasi akademik merupakan faktor yang paling berpengaruh terhadap hasil prediksi. Sistem yang dibangun menggunakan *framework Flask* berhasil menyediakan fitur pemodelan, prediksi, dan interpretasi hasil. Pengujian *usability* memperoleh nilai 80,91% dengan kategori sangat baik. Hasil penelitian menunjukkan bahwa sistem mampu membantu proses seleksi penerimaan beasiswa secara lebih objektif, efektif, transparan, dan mudah digunakan. Penelitian selanjutnya disarankan menggunakan data yang lebih banyak serta mengembangkan sistem untuk berbagai jenis beasiswa.

Kata Kunci: Sistem Pendukung Keputusan, Beasiswa, *XGBoost*, *SHAP*.

ABSTRACT

This study aims to build a web-based Decision Support System (DSS) to determine the eligibility for receiving the Sanata Dharma Student Fund (SDSF) scholarship using the Extreme Gradient Boosting (*XGBoost*) and SHapley Additive Explanations (SHAP) algorithms. The study uses 949 historical data of scholarship recipients with 34 initial features that go through the stages of preprocessing, normalization using MinMaxScaler, feature selection, *XGBoost* modeling, and interpretation using SHAP. The results of the study show that the best model is obtained at a K-Fold of 5, n_estimators of 100, max_depth of 3, learning_rate of 0.1, subsample of 0.7, colsample_bytree of 0.7, and gamma of 0 with a cross-validation accuracy of 82.08% and a testing accuracy of 81,05%, precision of 78,07%, recall of 89%, and F1-score of 83,18% using 20 selected features. SHAP analysis shows that ownership of SK Tidak Mampu (Certificate of Inability), the amount of electricity bills, parental conditions, parental income, the amount of tuition payment arrears, as well as academic activities and achievements are the most influential factors on the prediction results. The system built using the Flask framework successfully provides features for modeling, prediction, and result interpretation. The usability testing obtained a score of 80.91% in the very good category. The results of the study show that the system is able to help the scholarship admission selection process to be more objective, effective, transparent, and easy to use. Further research is suggested to use more data and develop systems for various types of scholarships.

Keywords: Decision Support System, Scholarship, XGBoost, SHAP.